

WHAT IS CLAIMED IS:

See. minor

1. A polarizing filter having a laminate structure:

wherein a plurality of dielectric materials different from one another in refractive index with respect to a wavelength of incident light are classified into a first group and a second group so that a maximum value among the refractive indices of the dielectric materials belonging to said first group is lower than a minimum value among the refractive indices of the dielectric materials belonging to said second group;

wherein at least one layer of dielectric thin film selected from the dielectric materials belonging to said first group and at least one layer of dielectric thin film selected from the dielectric materials belonging to said second group are alternately laminated on a transparent flat substrate to form said laminate structure; and

wherein one layer of the dielectric thin film having a refractive index which is higher than the maximum value selected from said refractive indices of the dielectric materials belonging to said first group and which is lower than the minimum value selected from said refractive indices of the dielectric materials belonging to said second group is laminated on an outermost surface of said laminate structure.

2. A polarizing filter having a laminate structure:

wherein a plurality of dielectric materials different from one another in refractive index with respect to a wavelength

of incident light are classified into a first group and a second group so that the maximum value among the refractive indices of the dielectric materials belonging to said first group is lower than the minimum value among the refractive indices of the dielectric materials belonging to said second group;

wherein at least one layer of dielectric thin film selected from the dielectric materials belonging to said second group and at least one layer of dielectric thin film selected from the dielectric materials belonging to said first group are alternately laminated on a transparent flat to form said laminate structure; and

wherein one layer of the dielectric thin film having a refractive index which is higher than the maximum value selected from said refractive indices of the dielectric materials belonging to said first group and which is lower than the minimum value selected from said refractive indices of the dielectric materials belonging to said second group is laminated on an outermost surface of said laminate structure.

3. A polarizing filter according to Claim 1 or 2, wherein one to four layers of dielectric thin films selected from said first group and one to four layers of dielectric thin films selected from said second group are laminated alternately on said transparent flat substrate.

4. A polarizing filter according to Claim 1 or 2, wherein a refractive index difference with respect to the wavelength

of incident light between adjacent dielectric thin films selected from the dielectric materials belonging to said first and second groups respectively is in a range of from 0.15 to 1.2, both inclusively.

5 5. A polarizing filter according to Claim 1 or 2, wherein optical film thickness of each of said dielectric thin films is in a range of $0.25\lambda \pm 0.15\lambda$ in which λ is a wavelength of incident light.

10 6. An optical device using a polarizing filter defined in Claim 1 or 2, wherein an angle of incidence on said polarizing filter is in a range of from 20 to 70 degrees.

7. A polarizing filter comprising:

a transparent substrate; and

15 at least three layers laminated one on another on said substrate, said at least three layers including an outermost layer having a first refractive index, and odd and even number layers interposed between said outermost layer and said substrate, wherein:

20 a refractive index of each said odd number layer is higher than the first refractive index; and

a refractive index of each said even number layer is lower than the first refractive index.

8. A polarizing filter comprising:

a transparent substrate; and

25 at least three layers laminated one on another on said

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substrate, said at least three layers including an outermost layer having a first refractive index, and odd and even number layers interposed between said outermost layer and said substrate, wherein:

5 a refractive index of each said odd number layer is lower than the first refractive index; and

a refractive index of each said even number layer is higher than the first refractive index.

10 9. A polarizing filter according to claim 7 or 8, wherein total number of at least three layers is not larger than seven.

10. A polarizing filter according to claim 7 or 8, wherein the first refractive index is 1.62 or 1.46.

15 11. A polarizing filter according to claim 7, wherein said at least three layers are constructed by three layers, the refractive index of the first layer is 2.13, the refractive index of the second layer is 1.46, and the first refractive index of the outermost layer is 1.62.

20 12. A polarizing filter according to claim 7, wherein said at least three layers are constructed by three layers, the refractive index of the first layer is 2.13, the refractive index of the second layer is 1.40, and the first refractive index of the outermost layer is 1.46.

25 13. A polarizing filter according to claim 7, wherein said at least three layers are constructed by seven layers, the refractive indexes of the first to sixth layers are 2.13, 1.46,

2.13, 1.46, 2.13 and 1.46, respectively, and the first refractive index of the outermost layer is 1.62.

14. A polarizing filter according to claim 7, wherein said at least three layers are constructed by five layers, the refractive indexes of the first to fourth layers are 2.13, 1.46, 2.13 and 1.46, respectively, and the first refractive index of the outermost layer is 1.62.

15. A polarizing filter according to claim 8, wherein said at least three layers are constructed by seven layers, the refractive indexes of the first to sixth layers are 1.40, 1.62, 1.40, 1.62, 1.40 and 1.62, respectively, and the first refractive index of the outermost layer is 1.46.

16. A polarizing filter according to claim 8, wherein said at least three layers are constructed by five layers, the refractive indexes of the first to fourth layers are 2.13, 1.40, 1.95 and 1.46, respectively, and the first refractive index of the outermost layer is 1.62.